

# INFRAFLOOR®

underfloor heating

# CABLE



## Installation Manual

# INSTALLATION INSTRUCTIONS

# INFRAFLOOR

## underfloor heating cable

Please read these notes carefully and follow the instruction guidelines shown in this booklet as they will ensure optimum, safe performance and may also affect the validity of the warranty provided. If in any doubt consult your supplier.

This InfraFloor underfloor heating cable shall be installed in the floor only by qualified personnel who are familiar with the construction and operation of the product and the risks involved. The installation of this heating product shall be in accordance with the manufacturer's instructions and the regulations of the authority having jurisdiction.

### Attention!

The installation shall be made in accordance with Article 424, Part J, of the NEC, NFPA 70. The final connection to the power supply MUST be carried out by a suitably qualified electrician.

The minimum handling installation temperature for your InfraFloor cable is 23°F.

**NEVER** turn the **INFRAFLOOR™** heating system on when it is roll up or heating cables touch each other. It will destroy the unit, void the Warranty and may cause fire hazard.

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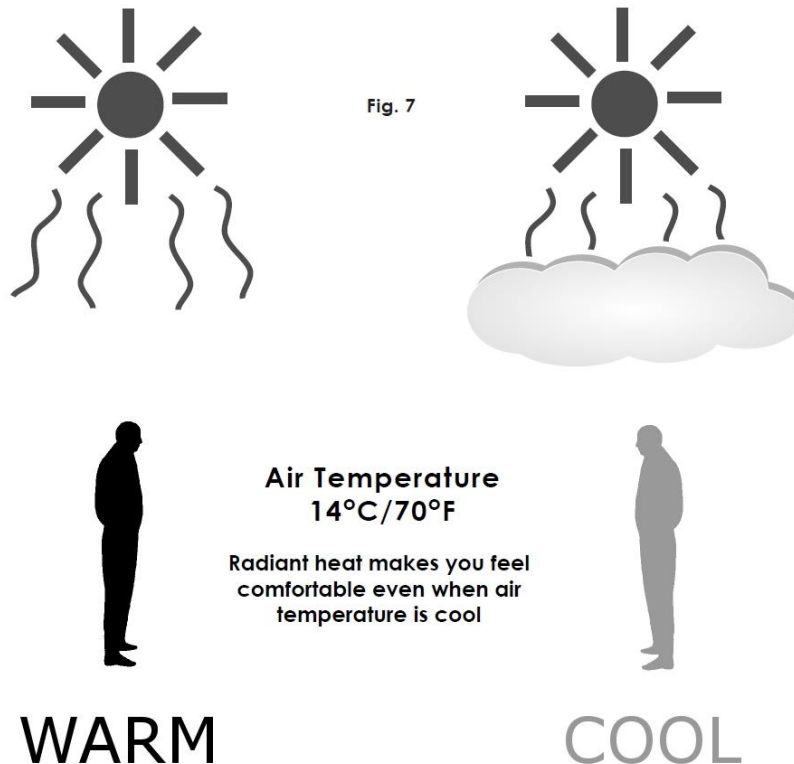
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## WHAT IS RADIANT HEAT?

The FloorHeat Systems radiant floor heating system installed in your home is the most efficient electric heating system available today. The **INFRA FLOOR** system installed directly below your floor, gently warms the objects and people in the room. These surfaces include walls, windows, floors and ceilings. These surfaces then gently warm the surrounding air, creating a more natural warmth with minimal floor to ceiling temperature variation. This means that the air temperature can be lowered in the room while still maintaining comfort levels – this results in a reduction in heating bills over other conventional forms of electric heating systems.

This manual is provided to help you understand how your heating system works and therefore how to operate it to maximum efficiency.

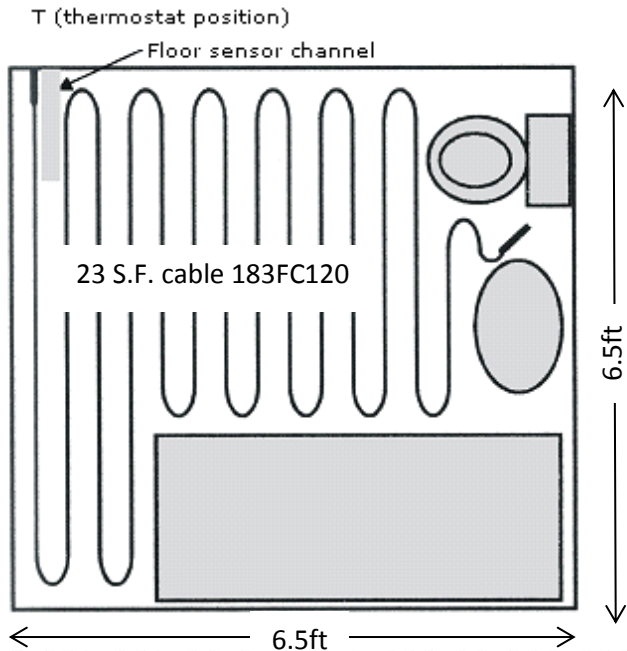


The **INFRA FLOOR** underfloor heating system works just like the sun. The heating elements warm the floor surface which then emits energy in the form of infrared heat. This is the same type of heat you feel when out on a sunny but cool spring day. Although the air temperature is cool the infra-red rays from the sun keep you warm.

An **INFRA FLOOR** radiant heating system is the most efficient form of heat distribution available. The radiant heat in the form of Infra-red energy radiates throughout the room. The objects and occupants are heated first and then gently warm the surrounding air. As the body of air in the room is not overheated convection currents are not created. This means that dust is not circulated and drafts are not created. This brings higher levels of comfort, not only to allergy sufferers but to everyone in the room.

The **INFRA FLOOR** heating system is completely invisible and unobtrusive and allows more flexibility in creating the perfect living environment. It is reliable, safe and manufactured to last. Being electric with no moving parts it is completely maintenance free.

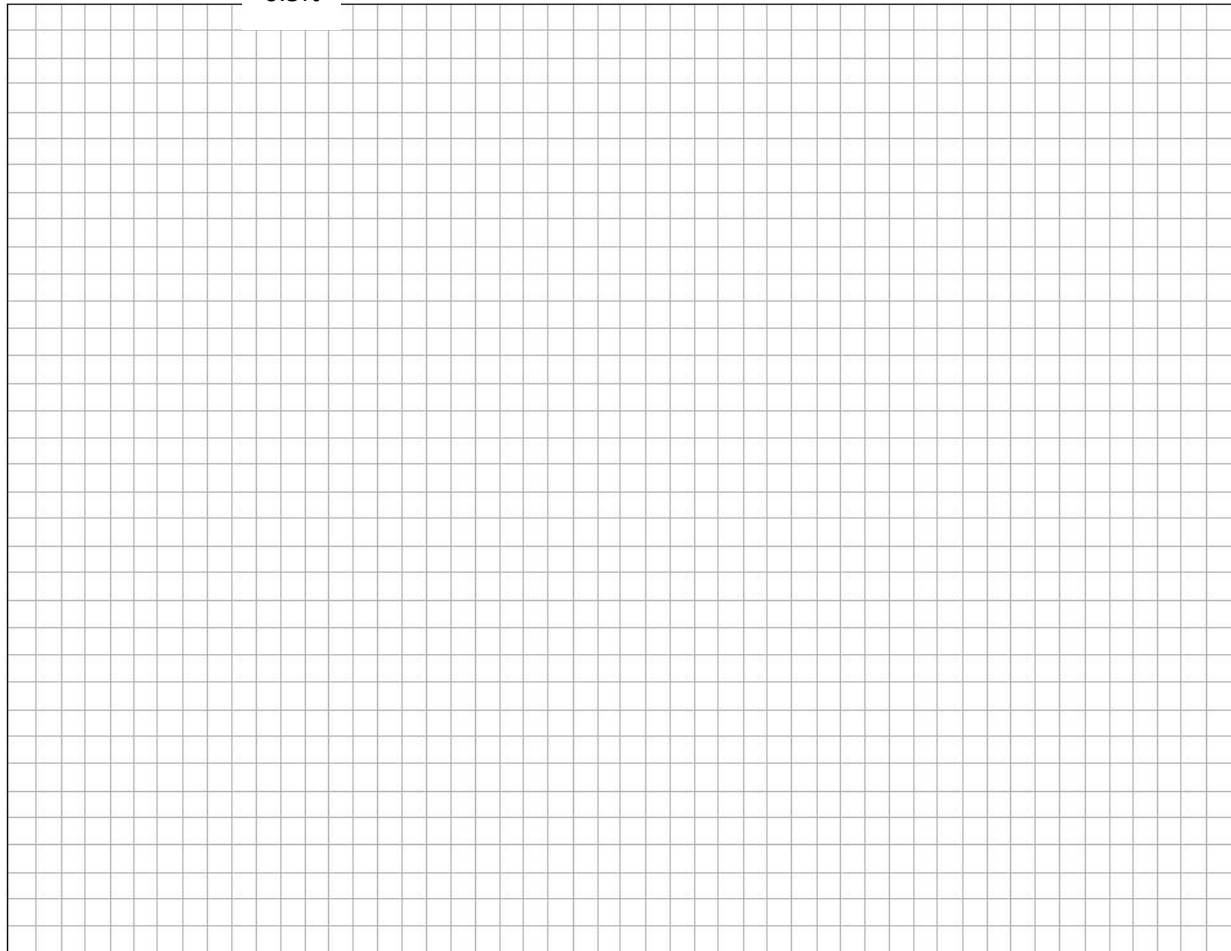
# INSTALLATION PLAN



Please retain a detailed layout plan using the example to the left as a guide.

Take care to show the following:

- Product used
- Thermostat position
- Junction box position
- Start and end of cable run
- Floor probe position
- Any fixed furniture/fitings
- Room dimensions



## 1). Measuring

It is important to measure the room correctly and avoid all permanent fixtures such as bathtubs, showers, kitchen cabinets and appliances. Avoid thermally blocking heated areas to prevent localized heat buildup and possible damage to the heat cable and floor covering. Allow a non-heated perimeter clearance by deducting about 5% from the total floor covering area.

### Power Output requirements.

Refer to the table below; cable spacing can be varied to achieve different heat levels.

Power Output	Cable Spacing
15 W/ft <sup>2</sup>	2.0 inches
12 W/ft <sup>2</sup>	3.0 inches

Note: The distance between adjacent runs of heating cable shall be as specified above and at all times the MINIMUM distance must be 2 inches.

### Details of InfraFloor cable range.

120 Volts SKU	Coverage, sq. ft.		Output (Watts)	Current (Amps)	Cable Length, (ft)	Unit Resistance, (Ohms)
	2" spacing	3"				
54FC120	5	7	77	0.6	24.8	187.1
87FC120	8	11	132	1.1	40.1	109.4
141FC120	12	18	203	1.7	65.1	71.1
183FC120	16	23	272	2.3	84.6	52.9
270FC120	23	34	406	3.4	125.0	35.4
375FC120	32	47	562	4.7	173.8	25.6
468FC120	40	59	703	5.9	216.9	20.5
591FC120	50	74	880	7.3	274.0	16.4
672FC120	57	84	985	8.2	311.6	14.6
711FC120	60	89	1054	8.8	329.7	13.7
240 Volts SKU	Coverage, sq. ft.		Output (Watts)	Current (Amps)	Cable Length, (ft)	Unit Resistance, (Ohms)
	2" spacing	3"				
48FC240	4	6	70	0.3	22.0	820.2
108FC240	9	14	153	0.6	49.8	376.6
174FC240	15	22	262	1.1	80.5	219.7
282FC240	24	36	404	1.7	130.6	142.5
366FC240	31	46	544	2.3	169.6	106.0
540FC240	45	68	812	3.4	250.3	71.0
750FC240	63	94	1123	4.7	347.8	51.3
1182FC240	99	148	1758	7.3	548.3	32.8
1344FC240	113	168	1968	8.2	623.5	29.3
1422FC240	119	178	2106	8.8	659.7	27.4

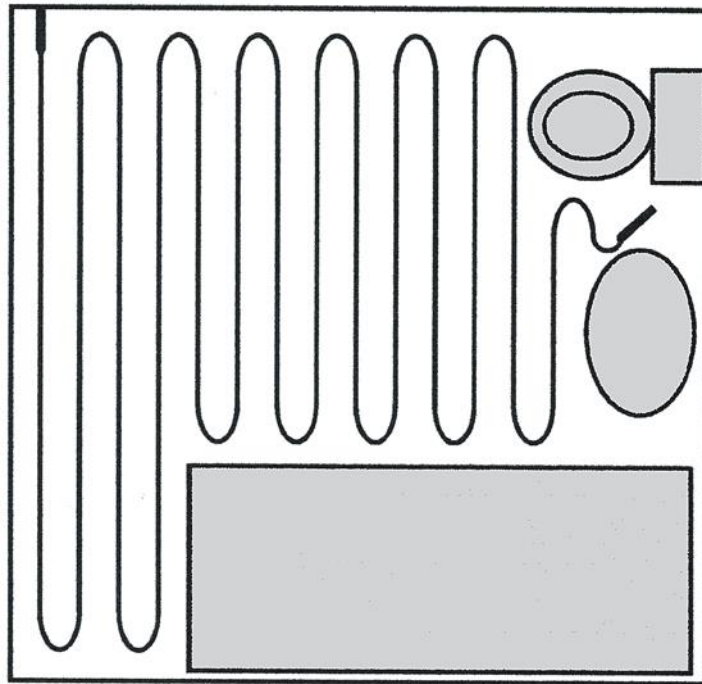
**InfraFloor®** cables incorporate ground wires and factory-assembled connections are hermetically sealed to allow installation in wet areas.

The diagram shows a bathroom that is just over 42 sq. ft. The total usable area is however 23 sq. ft. Therefore for optimum heat output the correct cable to use is InfraFloor Cable Model #183FC120 covering 23 sq. ft. at 3" spacing.

This example also highlights the advantage of the InfraFloor twin conductor heating cable requiring connection to the electricity supply at one end only thereby removing the need to design the layout to get the cable back to the termination/thermostat point.

(If in doubt and on receipt of a marked and scaled drawing your supplier will calculate the appropriate amount of cable required).

Figure 1.



## **2). Floor preparation**

Cables can be laid onto most existing floor surfaces that are sound and suitably prepared. Any existing floor coverings such as carpet or vinyl must be removed. Bitumastic sealant should be covered with a floor-leveling cement.

### **Primer.**

When installing the cable over concrete, wood or existing tiled floors refer to the manufacturer's standard guidelines.

### **Concrete floor.**

New concrete floors must be allowed time to cure naturally. This will depend on weather conditions but normally 1 week per 1" of thickness is taken as a guideline. Existing concrete floors must be cleaned and leveled and where necessary a self-leveling cement (latex modified Portland cement is recommended) should be applied before installing the heat cable.

## Wood floors.

Existing wood floors must be clean, sound and level. To achieve this it may be necessary to screw down a new layer of plywood, marine board or backer board.

## Insulation – Type of Suitable Material.

To ensure optimum performance and minimize running costs, floor insulation such as cork or polystyrene foam board should be laid directly under the heating cable. Particularly suitable for retrofit installation is the use of scrim faced reinforced extruded polystyrene board, minimum thickness 6mm (1/4") and minimum thermal resistance value of  $R=1$  per 1/4") is recommended.

## 3) Marking and other preparatory work

Having determined the size of the area to be heated, the heat level required and the electrical supply position, form a floor sensor channel in the floor adjacent to this point as illustrated.

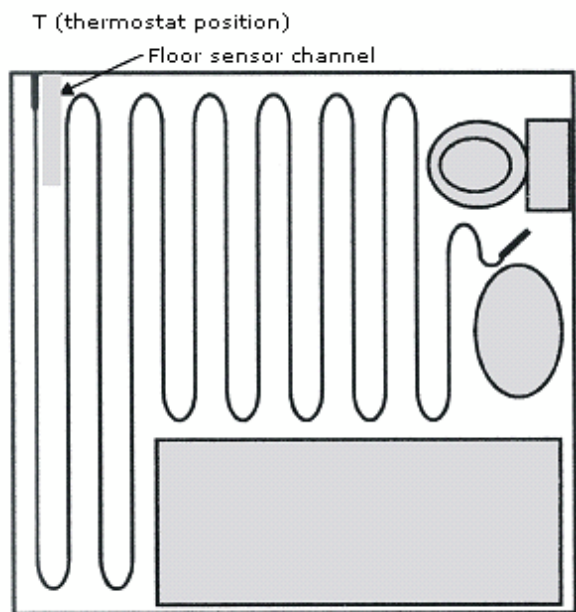
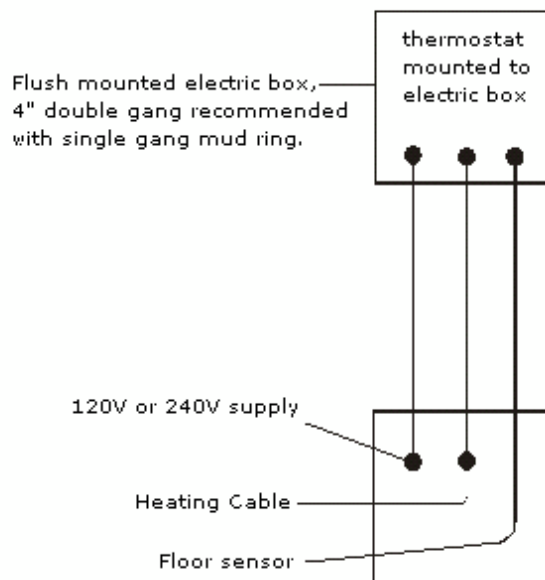


Figure 2.

Figure 3.



With a suitable marker and tape measure or FixFast Cable Strap, mark the cable rows centered equally at opposite ends of the room taking into account that the installed cables should be no closer than 2" from the walls and any other permanently fixed obstructions.

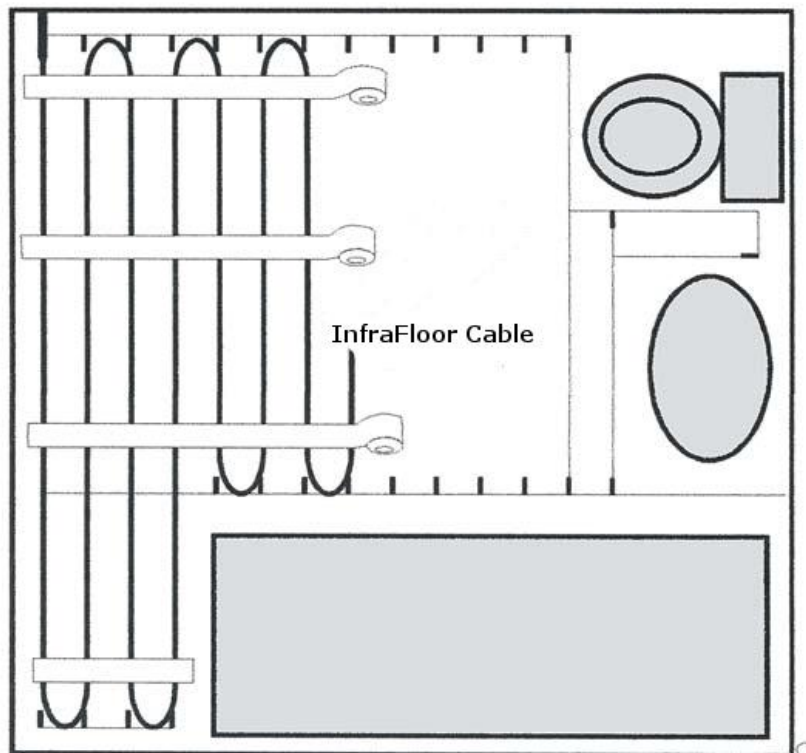
**IMPORTANT:** Cables must never touch or cross each other at any time and the underfloor heating cable shall not extend beyond the room or area in which it originates.

**WARNING:** Risk of electric shock and fire. Damage to supply conductor insulation may occur if conductors are routed less than 2" from the heating product. Refer to above for recommended means of routing supply electrical conductors.

Final connection and testing should be carried out by a qualified electrician but prior to this and at this stage a thermostat and electrical power supply provision should be made as shown in figure 2.

#### **4) Laying the cable**

Do not take the cable off the spool before laying as it will twist and make the installation difficult.



Connection is only required at one end of the cold lead wire. The first (10ft) black cable is cold lead wire that can be cut as required.

**The orange cable is the heated part that must never be cut or shortened.**

**Connections of multiple cable sets must be done in PARALLEL at the power source/thermostat.**

**NEVER cut off the end of the cable or attempt to connect cables in SERIES.**

As shown, loop the cables to the required marked spacings and secure to the floor as you go using FixFast Cable Strap (see pg.9) or duct tape.

Towards completion, it may be necessary to slightly adjust the cable spacings to the available area. This will not be a problem as long as the cables remain at least 2" apart and do not cross or touch each other.

Never bury or try to hide the cable. If necessary, start again.

If you have ordered the wrong size of cable contact your supplier immediately.

***Refer to the table on page 5 and test the cable circuit for continuity (resistance) using an ohmmeter, and check against the resistance recorded on the ETL label attached to the cold (non-heating) lead wire BEFORE and AFTER applying the mortar and tiling. Avoid traffic over the laid area until floor tiling is complete.***



## HOW TO USE FIXFAST™ CABLE STRAP

**1** Secure FixFast to the subfloor using nails, screws or hot glue.

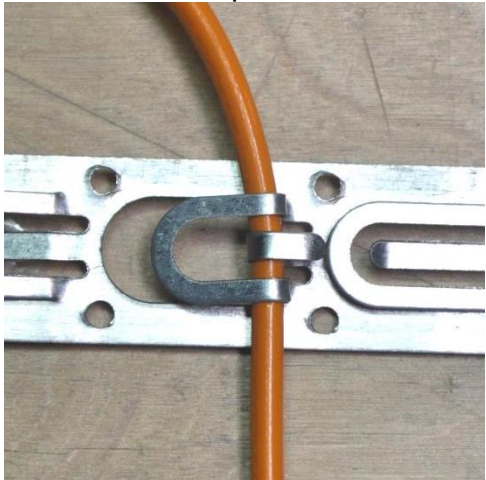
**2** Lift FixFast loop, place heat cable.



**3** Fold FixFast tab over heat cable.



**4** Fold FixFast loop over heat cable.



**5** Repeat.



## Precautionary Measure

**Very Important:** In the event that the measured resistance does not agree with the ETL label, careful inspection of the heating cable must be made to check for any physical damage.

Any damaged or defective cable should be removed and replaced before they are covered and sealed.

Contact Customer Support if you have any questions or concerns before continuing.

## Shower Installation:

**Installation shall be made in accordance with the National Electric Code, NFPA-70. Final acceptance is to be made by the Authority Having Jurisdiction (AHJ).**

**InfraFloor Cable** is manufactured to be waterproof and may be installed in shower applications by following all the installation instructions in this manual, the additional instructions listed below and all local and national electric codes.

It is highly recommended to connect the InstAlarm® installation monitor during the installation to warn about accidental damage to the heating or lead wires.

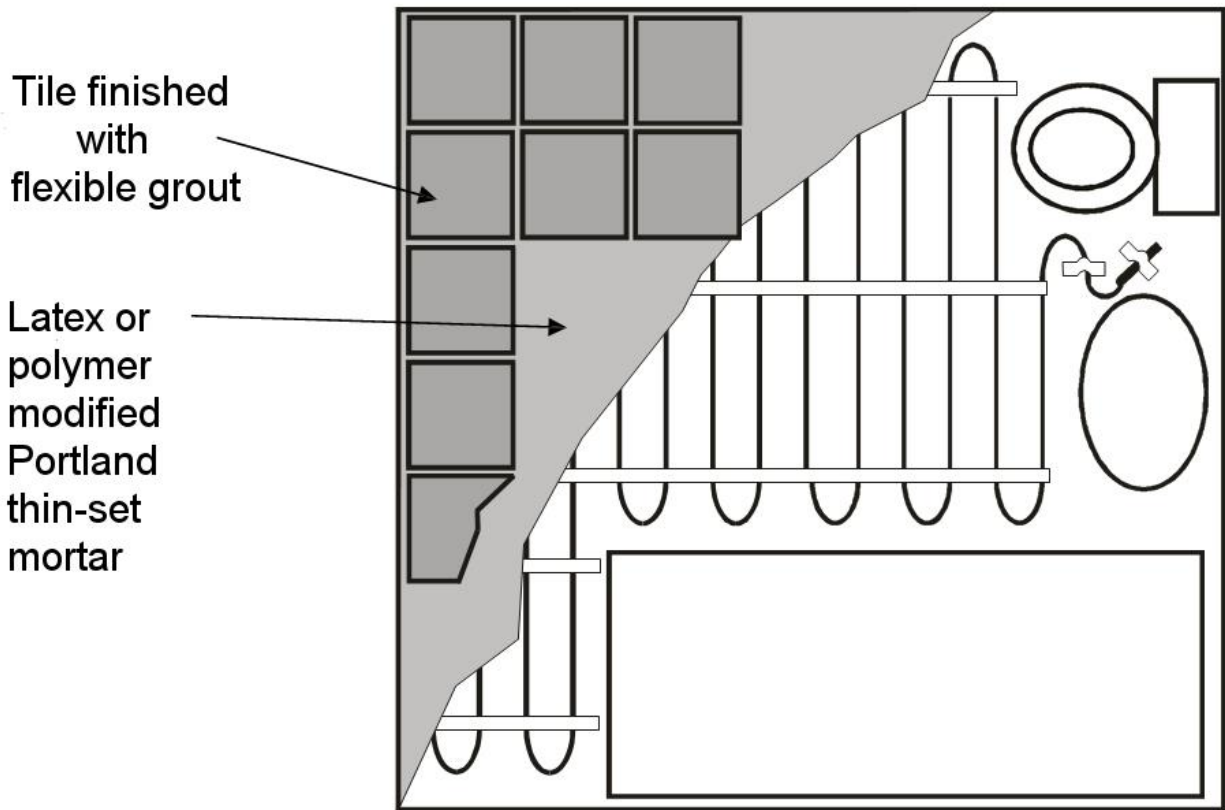


1. A separate InfraFloor Cable may be started in the shower or continued from the main bath floor by routing the heat cable up, over and down the shower curb or up to the shower seat for heating the top of the seat. Maintain a soft turning radius when flexing the wire while making these transitions to insure that the heating wire is not severely creased at a 90 degree angle.
2. Never make a field splice or repair to any section of the InfraFloor Cable installed in a shower; serious hazard could result.
3. Completely embed InfraFloor Cable and lead wire including connection in minimum ½” thick thin-set mortar with no air gaps.
4. Install a water-proof membrane above the heating mat following the membrane manufacturer’s instructions. Membranes should add negligible R-value.
5. Check InfraFloor Cable resistance at all intervals during the installation as explained elsewhere in these guidelines.
6. Install ceramic tile, marble, porcelain, stone or other masonry surface.
7. The thermostat or other control must be located at least 4’ away from shower openings so the thermostat or control is not exposed to water or within reach of a person taking a shower.
8. Connect the mats to a Class A (5mA GFCI) thermostat (or separate Class A GFCI in the circuit). **The thermostat must be placed 4 ft. away from shower areas.**

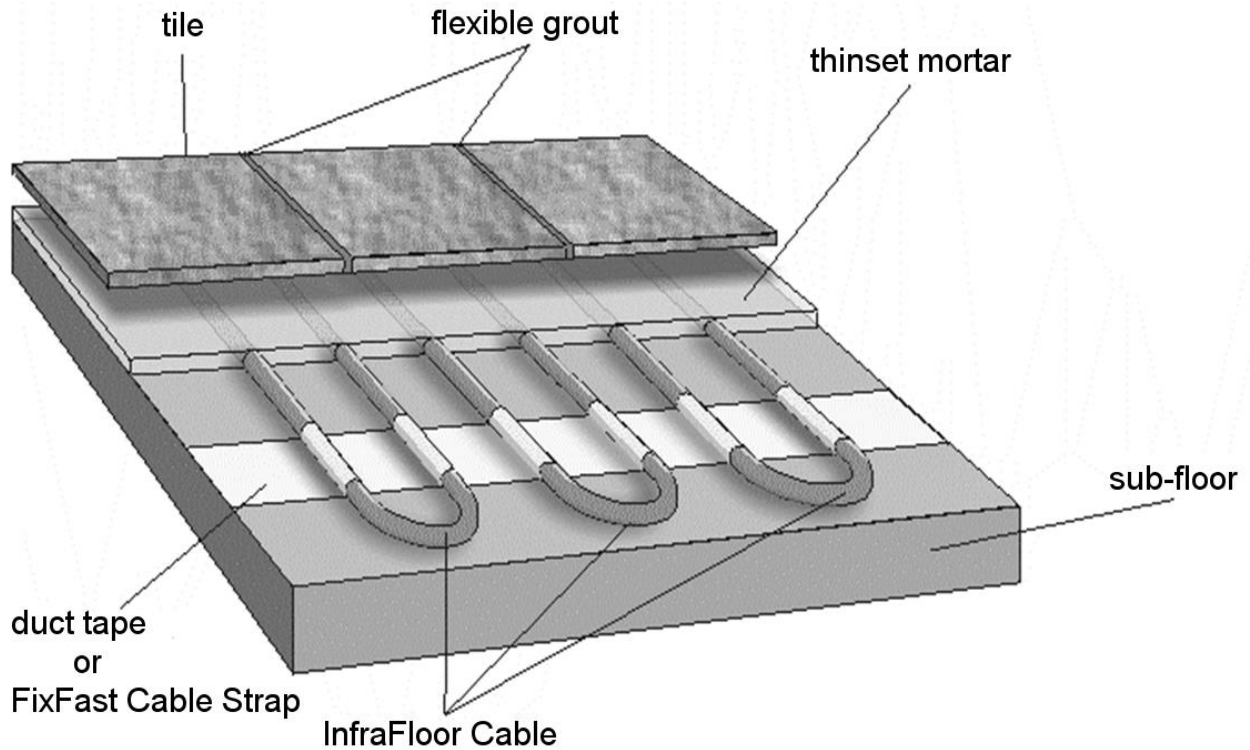
## 5). Install the Thermostat and Floor Probe

Follow the instructions provided with the thermostat and the floor probe/sensor wire. Install a second backup sensor wire to avoid future replacement. Run the second (backup) floor sensor wire to the thermostat electric box but DO NOT connect it. Connect only one floor sensor to the thermostat at a time.

**Finished Floor Diagrams**

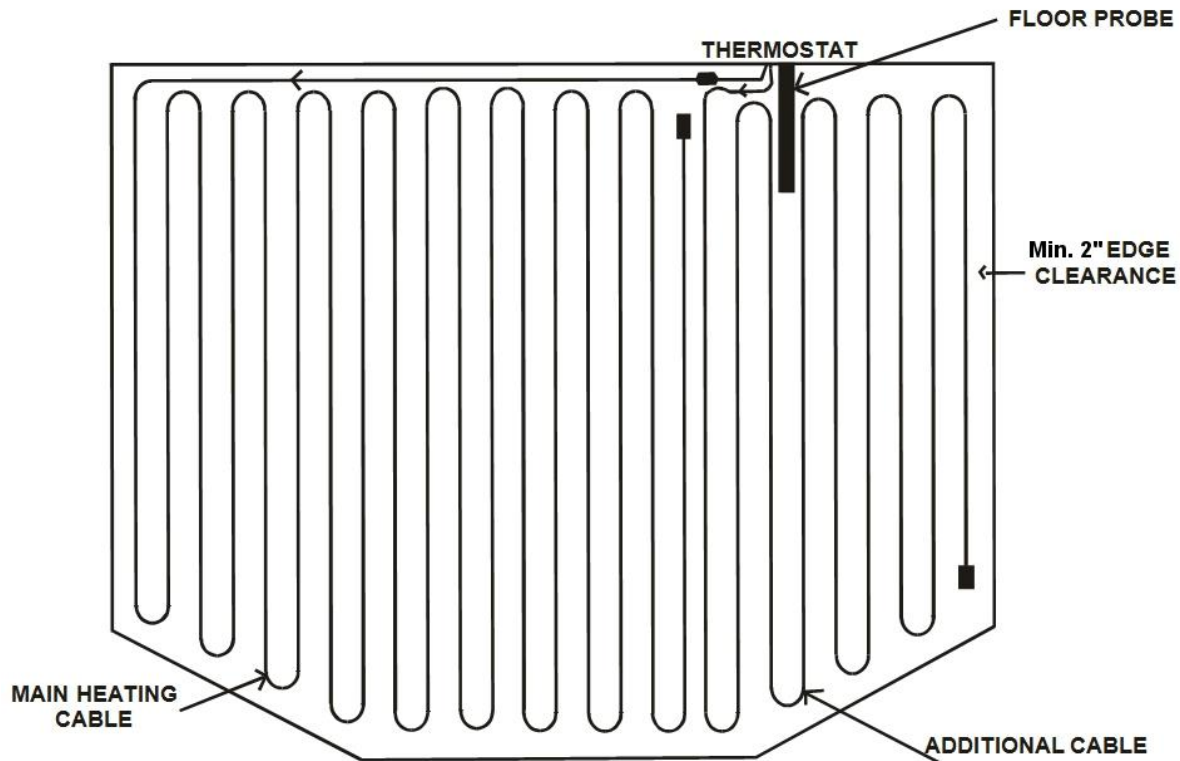


**Cross Section**



## 6). Installation of larger areas requiring 'add-on' cables

Illustrated is a 215 square foot conservatory requiring 204 sq.ft. coverage (5% less) allowing for edge clearance. Select the main cable SKU# 1344FC240 to cover 168 sq.ft. with 3" spacing. Then select SKU 282FC240# to cover an additional 36 sq. ft. with 3" spacing.



**First, mark out the floor as previously described.**

Using the main cable, run this out from the termination point to the opposite end of the room and lay at 3" spacings (168 sq ft coverage) back towards the control point. Check that remaining floor area will accommodate the additional cable (36 sq ft coverage). Lay the additional cable and if necessary adjust the spacing to achieve full floor coverage.

The thermostat sensor must be positioned in the middle between the cable loop.

### **Tiling the floor – Type of suitable materials.**

Once the cables are laid, a suitable protection (cardboard / old carpet / plywood) must be provided to avoid damage during tiling.

The use of a polymer modified (latex or acrylic) Portland cement thin-set mortar and a flexible grout is recommended.

Thin-set mortar can be laid in either a single or a two layer operation depending on the tiler's preference to accommodate the cable thickness. The mortar must be laid evenly in the same direction as the cables are running making sure there are no air gaps or spaces.

## 7) Final testing

The electrician should test the continuity of the floor sensor and retest the resistance of each cable. Make sure the heater is connected to the proper Voltage supply – 120V or 240V. The electrician should fix the mandatory warning labels at the main electric supply panel and at the individual room thermostat and complete the certificate below which must be retained as part of the warranty requirement.

### **WARNING**

**Risk of electric shock. Electric wiring and heating panels contained below the floor. Do not penetrate with nails, screws or similar devices.**

*Fix this label to the main panel.*

### **RADIANT FLOOR HEATING**

*Fix this label to the thermostat.*

In addition mark the appropriate circuit breaker with reference label indicating which branch circuit supplies the circuits to the underfloor heating cable.

## 8) Switching on.

Before switching on the underfloor heating allow a minimum of 3 days for natural drying of the tile adhesive and grout. Initially operate the system for 2-3 hours per day increasing to full continuous operation after 6-7 days.

## 9) Heat-up times

The speed of response of your **INFRAFLOOR®** system depends on several factors including subfloor construction and tile material and thickness.

The table below provides indications of heat-up times for various sub-floor constructions.

<b>Subfloor Construction</b>	<b>Heat-up Time (hrs)</b>
Insulation board (0.5") on wood	0.5
Concrete Screed Floor (Insulated under screed)	2-5
Un-Insulated Concrete	3-8+
Concrete with Insulated board (0.5")	1

## 10) Warranty

Following installation, the warranty certificate on page 15 of this installation guide should be FULLY completed and retained including a plan of the cable layout and position of the floor sensor (see page 4). A photograph of the complete cable layout and sensor positioning before tiling is highly recommended. These records could then be used for locating the cable in warranty claim situations.

## SYSTEM OPERATION

Operation of your **INFRAFLOOR®** heating system is similar to other conventional heating systems. Your method of control is via the wall mounted room thermostat. Set the thermostat to your desired temperature and the system will warm the room. There are several points to consider when operating your system to ensure economical operation:

1) Following installation of your **INFRAFLOOR** heating system there are several precautions you should take on initial start – up of the heating system.

Do not be tempted to turn on the system immediately after laying the finished floor. Depending on the floor covering please allow time for the thin-set mortar or leveling compound to cure completely (see manufacturer's guidelines). Bring the system up to temperature gradually in stages over the next few days using the floor limit sensor temperature setting.

2) Each room installed with an **INFRAFLOOR** heating system will have its own thermostat. This means that you can individually set the room temperature based on the use of the room. If the room is rarely used, turn the thermostat down to a lower level to conserve energy.

3) Your **INFRAFLOOR** heating system is a direct acting system. However depending on the subfloor and the floor covering installed there may be a certain amount of thermal lag in the system (heat-up and cool down periods). Please anticipate these when switching your system on and off. Careful time clock control of on/off periods ensure maximum comfort at minimum cost.

4) Although your radiant heating system is less affected by air change/ventilation losses than a traditional convection heating system it is good practice to minimize drafts from open doors or windows as these can make occupants feel cold.

5) Set the thermostat to your desired comfort level and leave it. Setting the thermostat to a high temperature will not make the room get to temperature quicker. It will merely overheat the occupants once the set temperature is reached.

6) Thermostats are fitted with floor limit sensors. The temperature of the actual floor can be varied to suit individual comfort levels. We recommend a maximum floor temperature setting of 82°F for optimum comfort conditions.

### Be Aware

Although your **INFRAFLOOR** heating system requires no annual maintenance, care should be taken to ensure that the system is not damaged. Additional information for renovating and repairing is available in the system's installation manual.

1) Never pierce the floor. Piercing an electrically conductive cable with a nail or screw can trip the GFCI and cut all power to the system.

2) Never cover any heated part of the floor with walls, solid bottomed or permanent floor fixtures or furniture. This could trap heat and potentially cause local overheating.

3) Thick rugs, dog beds, bean bags, exercise mats and items with high thermal insulation should not be laid on the heated floor as this may cause localized overheating.

### Information for repair or renovation tradesmen

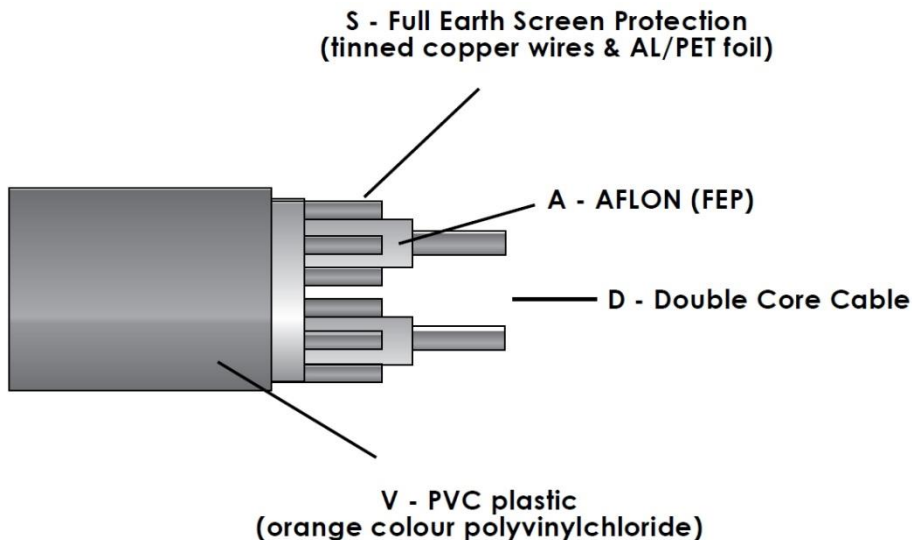
Please inform all repair or renovation tradesmen if they are working in the area of an installed **INFRAFLOOR** heating system, they should read the information contained within the installation and operating manual before commencing work. Failure to comply with this information may result in risk of electric shock.

## TROUBLESHOOTING

Should you experience any problems with your INFRAFLOOR® installation not warming your floor surface, please carry out the following tests before calling the FloorHeat Systems technical support team.

Step	Test	Outcome	Action
1	Check for a 120/240V supply to the thermostat terminals.	120/240V	If no voltage present check supply.
2	Set the thermostat to the highest position and test for a 120/240V output. This may take a few minutes.	120/240V	First, check the resistance of the floor sensor (step 3). If the floor sensor is normal the thermostat is faulty. Contact your supplier.
3	Turn off power to thermostat and test floor limit sensor resistance.	Approximately 8-12KΩ for temperatures 68-86°F	If sensor is faulty, contact your supplier for a replacement or connect backup sensor.
4	Turn off power to the thermostat and ensure cable resistance.	Depends on cable size (see cable label)	If cable is faulty or has been damaged. Contact your supplier.
5	Turn off power to the thermostat and measure resistance between the conductors and the ground wire.	Yes (resistance value)	If there is continuity (resistance) between the conductor and ground, the cable has been damaged. Contact your supplier.

## CABLE CONSTRUCTION



### Key Specifications:

- Maximum Power 15W/S.F. at 2" spacing between cables
- Diameter: 1/8" to <3/16"
- 120V or 240V supply
- Twin conductor cable
- 10' cold lead wire

**WARRANTY CERTIFICATE**  
**INFRAFLOOR®**  
 underfloor heating cable



Please complete this installation completion certificate and retain a copy to validate the warranty.			
Owners Name:			
Address:			
Room(s) Installed:			
Cable SKU#(s)			
Resistance (Ohms):			
Installer's Name:		Phone:	
Electrician's Name:		Phone:	
Electrician's License Number:			
Signed by electrician:		Date Completion Tested:	
<p style="text-align: center;">This warranty is only valid under the following conditions:</p> <ul style="list-style-type: none"> <li>All electrical connections were carried out by a qualified electrician</li> <li>The warranty covers faults in material for 10 years for INFRAFLOOR heating cable and 3 years for thermostats from the date of purchase.</li> <li>The non-working heater or thermostat must be sent back to supplier to investigate the reason for the fault.</li> <li>The completed warranty and proof of purchase must be presented in connection with warranty claims.</li> <li>An installation layout has been completed and retained. A photograph is suggested.</li> <li>The warranty covers the repair/replacement of goods found to be faulty due to manufacturing defect and does not cover secondary charges relating to the repair/replacement of any floor covering or any other cost.</li> <li>The FloorHeat Systems warranty does not cover faults resulting from incorrect design or installation or damage caused by others.</li> </ul>			
<b>Mailing Address: FloorHeat Systems 1954 First Street ▪ Highland Park, IL 60035 ▪ 888-203-9730</b>			